

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 8, 10, 14, 20, 22, 26, 28, 31-35, 38-41 and 44-47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koitabashi et al. (US 2002/0044185 A1) in view of Yui et al. (US 5462590 A).

Koitabashi et al. disclose the following claim limitations:

As per claims 8, 14, 20, and 22: the content of the amine compound is in a range of 13-30% by mass [0090] and the colorant is a self-dispersing pigment [0013].

As per claim 31: a content of the amine is in a range of 15-30% [0090] and the colorant is a self-dispersing pigment [0013].

As per claims 26 and 28: an amine compound in the range of 13 to 30% [0090], the colorant is a self-dispersing pigment [0013], or a colorless ink jet treatment liquid used together with an ink jet composition [0114].

Koitabashi et al. do not disclose the following claim limitations:

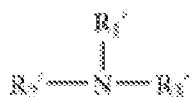
As per claim 8: an ink jet ink composition comprising at least water, a colorant and a water-soluble organic solvent, wherein the ink jet ink composition comprises at least one amine compound represented by the following formula (2):



wherein the amine compound represented by the formula (2) is any one of primary to tertiary amine compounds; at least one of three substituents represented by R_1' , R_2' and R_3' in the formula (2) comprises a hydrocarbon group having a hydroxyl group; and at least one of the three substituents comprises a hydrocarbon group containing an alkyl group having at its terminal either one of $-CO_2M$ and $-SO_3M$ in which M represents an atom or an atomic group selected from hydrogen, an alkali metal, an alkaline earth metal, an ammonium group and an organic amine group and the melting point of the amine compound is $50^\circ C$ or more.

As per claim 10: an ink-jet composition wherein the amine compound is selected from the group consisting of N,N-bis(hydroxyalkyl)glycine derivatives and N,N-bis(hydroxyalkyl)-2-aminoethanesulfonic acid derivatives.

As per claim 14: an ink jet recording method comprising forming an image by adhering an ink jet composition to a recording medium, wherein the ink jet composition comprises at least one amine compound represented by the following formula (2):



wherein the amine compound represented by the formula (2) is any one of primary to tertiary amine compounds; at least one of three substituents represented by R_1' , R_2' and R_3' in the formula (2) comprises a hydrocarbon group having a hydroxyl group; and at least one of the three substituents comprises a hydrocarbon group containing an alkyl group having at its terminal either one of $--CO_2M$ and $--SO_3M$ in which M represents an atom or an atomic group selected from hydrogen, an alkali metal, an alkaline earth metal, an ammonium group and an organic amine group and the melting point of the amine compound is $50^{\circ}C$ or more.

As per claim 20: an ink set comprising at least two inks comprising at least water, a colorant and a water-soluble organic solvent, wherein the ink jet ink composition comprises at least one amine compound represented by the following formula (2):



wherein the amine compound represented by the formula (2) is any one of primary to tertiary amine compounds; at least one of three substituents represented by R_1' , R_2' and R_3' in the formula (2) comprises a hydrocarbon group having a hydroxyl group; and at least one of the three substituents comprises a hydrocarbon group containing an alkyl group having at its terminal either one of $--CO_2M$ and $--SO_3M$ in which M represents an atom or an atomic group selected from hydrogen, an alkali metal, an alkaline earth metal, an ammonium group and an organic amine group and the melting point of the amine compound is $50^{\circ}C$ or more.

As per claim 22: an ink jet recording method comprising forming an image by using an ink set containing at least two ink by adhering an ink to a recording medium, wherein the ink comprises at least water, a colorant and a water-soluble organic solvent, wherein the ink jet ink composition comprises at least one amine compound represented by the following formula (2):



wherein the amine compound represented by the formula (2) is any one of primary to tertiary amine compounds; at least one of three substituents represented by R_1' , R_2' and R_3' in the formula (2) comprises a hydrocarbon group having a hydroxyl group; and at least one of the three substituents comprises a hydrocarbon group containing an alkyl group having at its terminal either one of $-CO_2M$ and $-SO_3M$ in which M represents an atom or an atomic group selected from hydrogen, an alkali metal, an alkaline earth metal, an ammonium group and an organic amine group and the melting point of the amine compound is $50^{\circ}C$ or more.

As per claims 26 and 28: an ink comprising water, a colorant and a water-soluble organic solvent, wherein the ink jet ink composition comprises at least one amine compound represented by the following formula (2):



wherein the amine compound represented by the formula (2) is any one of primary to tertiary amine compounds; at least one of three substituents represented by

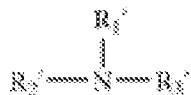
R_1' , R_2' and R_3' in the formula (2) comprises a hydrocarbon group having a hydroxyl group; and at least one of the three substituents comprises a hydrocarbon group containing an alkyl group having at its terminal either one of $--CO_2M$ and $--SO_3M$ in which M represents an atom or an atomic group selected from hydrogen, an alkali metal, an alkaline earth metal, an ammonium group and an organic amine group and the melting point of the amine compound is $50^\circ C$ or more.

As per claims 32, 34, 38, 40, 44, and 46: the melting point of the amine compound is $100^\circ C$ or more.

As per claims 33, 35, 39, 41, 45, and 47: the melting point of the amine compound is $180^\circ C$ or more.

Yui et al discloses the following claim limitations:

As per claim 8: an ink jet ink composition comprising at least water (column 2, lines 2-12), a colorant and a water-soluble organic solvent (column 2, lines 31-32), wherein the ink jet ink composition comprises at least one amine compound represented by the following formula (2):

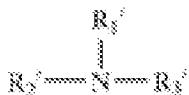


wherein the amine compound represented by the formula (2) is any one of primary to tertiary amine compounds; at least one of three substituents represented by R_1' , R_2' and R_3' in the formula (2) comprises a hydrocarbon group having a hydroxyl group; and at least one of the three substituents comprises a hydrocarbon group containing an alkyl group having at its terminal either one of $--CO_2M$ and $--SO_3M$ in which M represents an

atom or an atomic group selected from hydrogen, an alkali metal, an alkaline earth metal, an ammonium group and an organic amine group (column 2, lines 20-28) and the melting point of the amine compound is 50°C or more (column 4, lines 33-47 – listed amines have melting points over 180°C– taurin, N,N-bis-hydroxyethylaminoethane sulfonic acid).

As per claim 10: an ink-jet composition wherein the amine compound is selected from the group consisting of N,N-bis(hydroxyalkyl)glycine derivatives and N,N-bis(hydroxyalkyl)-2-aminoethanesulfonic acid derivatives (column 4, lines 33-47).

As per claim 14: an ink jet recording method comprising forming an image by adhering an ink jet composition to a recording medium (column 1, lines 11-18), wherein the ink jet composition comprises at least one amine compound represented by the following formula (2):



wherein the amine compound represented by the formula (2) is any one of primary to tertiary amine compounds; at least one of three substituents represented by R₁', R₂' and R₃" in the formula (2) comprises a hydrocarbon group having a hydroxyl group; and at least one of the three substituents comprises a hydrocarbon group containing an alkyl group having at its terminal either one of --CO₂M and --SO₃M in which M represents an atom or an atomic group selected from hydrogen, an alkali metal, an alkaline earth metal, an ammonium group and an organic amine group (column 2, lines 20-28) and the melting point of the amine compound is 50°C or more (column 4, lines 33-47 – listed

amines have melting points over 180°C – taurin, N,N-bis-hydroxyethylaminoethane sulfonic acid).

As per claim 20: an ink set comprising at least two inks (column 1, lines 11-18) comprising at least water (column 2, lines 2-12), a colorant and a water-soluble organic solvent (column 2, lines 31-32), wherein the ink jet ink composition comprises at least one amine compound represented by the following formula (2):



wherein the amine compound represented by the formula (2) is any one of primary to tertiary amine compounds; at least one of three substituents represented by R₁', R₂' and R₃' in the formula (2) comprises a hydrocarbon group having a hydroxyl group; and at least one of the three substituents comprises a hydrocarbon group containing an alkyl group having at its terminal either one of --CO₂M and --SO₃M in which M represents an atom or an atomic group selected from hydrogen, an alkali metal, an alkaline earth metal, an ammonium group and an organic amine group (column 2, lines 20-28) and the melting point of the amine compound is 50°C or more (column 4, lines 33-47 – listed amines have melting points over 180°C – taurin, N,N-bis-hydroxyethylaminoethane sulfonic acid).

As per claim 22: an ink jet recording method comprising forming an image by using an ink set containing at least two ink (column 1, lines 11-18) by adhering an ink to a recording medium, wherein the ink comprises at least water (column 2, lines 2-12), a colorant and a water-soluble organic solvent (column 2, lines 31-32), wherein the ink jet

ink composition comprises at least one amine compound represented by the following formula (2):



wherein the amine compound represented by the formula (2) is any one of primary to tertiary amine compounds; at least one of three substituents represented by R_1' , R_2' and R_3' in the formula (2) comprises a hydrocarbon group having a hydroxyl group; and at least one of the three substituents comprises a hydrocarbon group containing an alkyl group having at its terminal either one of $--CO_2M$ and $--SO_3M$ in which M represents an atom or an atomic group selected from hydrogen, an alkali metal, an alkaline earth metal, an ammonium group and an organic amine group (column 2, lines 20-28) and the melting point of the amine compound is $50^\circ C$ or more (column 4, lines 33-47 – listed amines have melting points over $180^\circ C$ – taurin, N,N-bis-hydroxyethylaminoethane sulfonic acid).

As per claims 26 and 28: an ink comprising water (column 2, lines 2-12), a colorant and a water-soluble organic solvent (column 2, lines 31-32), wherein the ink jet ink composition comprises at least one amine compound represented by the following formula (2):



wherein the amine compound represented by the formula (2) is any one of primary to tertiary amine compounds; at least one of three substituents represented by

R_1' , R_2' and R_3' in the formula (2) comprises a hydrocarbon group having a hydroxyl group; and at least one of the three substituents comprises a hydrocarbon group containing an alkyl group having at its terminal either one of $--CO_2M$ and $--SO_3M$ in which M represents an atom or an atomic group selected from hydrogen, an alkali metal, an alkaline earth metal, an ammonium group and an organic amine group (column 2, lines 20-28) and the melting point of the amine compound is 50°C or more (column 4, lines 33-47 – listed amines have melting points over 180°C – taurin, N,N-bis-hydroxyethylaminoethane sulfonic acid).

As per claims 32, 34, 38, 40, 44, and 46: the melting point of the amine compound is 100°C or more (column 4, lines 33-47 – listed amines have melting points over 180°C – taurin, N,N-bis-hydroxyethylaminoethane sulfonic acid). .

As per claims 33, 35, 39, 41, 45, and 47: the melting point of the amine compound is 180°C or more (column 4, lines 33-47 – listed amines have melting points over 180°C – taurin, N,N-bis-hydroxyethylaminoethane sulfonic acid). .

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the ink, method, and apparatus taught by Koitabashi et al. with the disclosure of Yui et al. in order to realize high quality images made with an ink that prevents clogging in the printhead and can be stored long term. It is also well known in the art to use different amines and different types of colorants in an ink, as well as different amounts of amines, as shown by Yui et al, therefore, it would have been obvious to use different amines within an ink.

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Koitabashi et al. (US 2002/0044185 A1) and Yui et al. (US 5462590 A) and further in view of Oki et al. (US 2002/0050226 A1).

Koitabashi et al. as modified teaches an ink jet ink composition; however, it does not disclose a surface tension of the ink composition is 40 mN/m or less.

Oki et al. teaches a surface tension of the ink composition is 40 mN/m or less [0021].

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the ink jet ink composition of Koitabashi et al. as modified with the disclosure of Oki et al. in order to create a higher quality and more consistent ink.

Claims 17, 18, 24, 30, 36, 37, 42, 43, 48, and 49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koitabashi et al. (US 2002/0044185 A1) in view of Yui et al. (US 5462590 A) and Koitabashi (US 6471348 B1).

Koitabashi et al. disclose the following claim limitations:

As per claims 17 and 24: the content of the amine compound is in a range of 13-30% by mass [0090] and the colorant is a self-dispersing pigment [0013].

As per claim 30: the content of the amine compound is in a range of 13-30% by mass [0090], the colorant is a self-dispersing pigment [0013] and a treatment liquid comprising at least water and a water soluble organic solvent [0114].

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the ink, method, and apparatus taught by Yui et al. with the

disclosure of Koitabashi et al. in order to realize high quality images. It is also well known in the art to use different amines in an ink, as well as different amounts of amines, as shown by Koitabashi et al, therefore, it would have been obvious to use a plurality of amines in different quantities.

Koitabashi et al. do not disclose the following claim limitations:

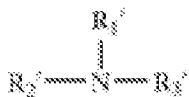
As per claim 17: an ink jet recording apparatus comprising a recording medium transfer section for transferring a recording medium in one direction while the recording medium faces the liquid ejection surface and a shortest distance between the recording medium and the liquid ejection surface is constantly maintained, the recording head moving in a direction perpendicular to the transfer direction of the recording medium and at least a recording head including a liquid ejection surface having a nozzle for ejecting a liquid wherein during printing an image is formed onto a surface of the recording medium from the liquid ejection surface, an ink composition comprising at least water, a colorant and a water-soluble organic solvent, wherein the ink jet ink composition comprises at least one amine compound represented by the following formula (2):



wherein the amine compound represented by the formula (2) is any one of primary to tertiary amine compounds; at least one of three substituents represented by R₁', R₂' and R₃' in the formula (2) comprises a hydrocarbon group having a hydroxyl group; and at least one of the three substituents comprises a hydrocarbon group

containing an alkyl group having at its terminal either one of $\text{--CO}_2\text{M}$ and $\text{--SO}_3\text{M}$ in which M represents an atom or an atomic group selected from hydrogen, an alkali metal, an alkaline earth metal, an ammonium group and an organic amine group, wherein the melting point of the amine compound is 50°C or more.

As per claim 24: an ink jet recording apparatus comprising at least a recording medium transfer section for transferring a recording medium in one direction while the recording medium faces the liquid ejection surface and a shortest distance between the recording medium and the liquid ejection surface is constantly maintained, the recording head moving in a direction perpendicular to the transfer direction of the recording medium a recording head including a liquid ejection surface having two nozzles for ejecting a liquid wherein during printing an image is formed onto a surface of the recording medium from the liquid ejection surface, an ink composition comprising at least two inks, which each comprise water, a colorant and a water-soluble organic solvent, wherein the ink jet ink composition comprises at least one amine compound represented by the following formula (2):



wherein the amine compound represented by the formula (2) is any one of primary to tertiary amine compounds; at least one of three substituents represented by R_1' , R_2' and R_3' in the formula (2) comprises a hydrocarbon group having a hydroxyl group; and at least one of the three substituents comprises a hydrocarbon group containing an alkyl group having at its terminal either one of $\text{--CO}_2\text{M}$ and $\text{--SO}_3\text{M}$ in

which M represents an atom or an atomic group selected from hydrogen, an alkali metal, an alkaline earth metal, an ammonium group and an organic amine group, wherein the melting point of the amine compound is 50°C or more.

As per claim 30: an ink jet recording apparatus comprising at least a recording medium transfer section transferring a recording medium in one direction while the recording medium faces the liquid ejection surface and a shortest distance between the recording medium and ejection surface is constantly maintained for printing images while moving the recording head in a direction perpendicular to the transfer direction of the recording medium and a recording head including a liquid ejection surface comprising at least two nozzles for independently ejecting at least two liquids to form an image on the recording medium and an ink set comprising water, a colorant and a water-soluble organic solvent, wherein the ink jet ink composition comprises at least one amine compound represented by the following formula (2):



wherein the amine compound represented by the formula (2) is any one of primary to tertiary amine compounds; at least one of three substituents represented by R₁', R₂' and R₃' in the formula (2) comprises a hydrocarbon group having a hydroxyl group; and at least one of the three substituents comprises a hydrocarbon group containing an alkyl group having at its terminal either one of --CO₂M and --SO₃M in which M represents an atom or an atomic group selected from hydrogen, an alkali

metal, an alkaline earth metal, an ammonium group and an organic amine group, wherein the melting point of the amine compound is 50°C or more.

As per claims 36, 42, and 48: the melting point of the amine compound is 100°C or more.

As per claims 37, 43, and 49: the melting point of the amine compound is 180°C or more.

Yui et al. discloses the following claim limitations:

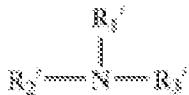
As per claim 17: an ink jet recording apparatus comprising at least a recording head including a liquid ejection surface having a nozzle for ejecting a liquid wherein during printing an image is formed onto a surface of the recording medium from the liquid ejection surface (column 1, lines 11-18 and column 1, line 59-column 2, line 1), an ink composition comprising at least water (column 2, lines 2-12), a colorant and a water-soluble organic solvent (column 2, lines 31-32), wherein the ink jet ink composition comprises at least one amine compound represented by the following formula (2):



wherein the amine compound represented by the formula (2) is any one of primary to tertiary amine compounds; at least one of three substituents represented by R₁', R₂' and R₃' in the formula (2) comprises a hydrocarbon group having a hydroxyl group; and at least one of the three substituents comprises a hydrocarbon group containing an alkyl group having at its terminal either one of --CO₂M and --SO₃M in which M represents an atom or an atomic group selected from hydrogen, an alkali

metal, an alkaline earth metal, an ammonium group and an organic amine group (column 2, lines 20-28), wherein the melting point of the amine compound is 50°C or more (column 4, lines 33-47 – listed amines have melting points over 180°C– taurin, N,N-bis-hydroxyethylaminoethane sulfonic acid).

As per claim 24: an ink jet recording apparatus comprising at least a recording head including a liquid ejection surface having two nozzles for ejecting a liquid wherein during printing an image is formed onto a surface of the recording medium from the liquid ejection surface (column 1, lines 11-18 and column 1, line 59-column 2, line 1), an ink composition comprising at least two inks, which each comprise water (column 2, lines 2-12), a colorant and a water-soluble organic solvent (column 2, lines 31-32), wherein the ink jet ink composition comprises at least one amine compound represented by the following formula (2):



wherein the amine compound represented by the formula (2) is any one of primary to tertiary amine compounds; at least one of three substituents represented by R_1' , R_2' and R_3' in the formula (2) comprises a hydrocarbon group having a hydroxyl group; and at least one of the three substituents comprises a hydrocarbon group containing an alkyl group having at its terminal either one of $\text{--CO}_2\text{M}$ and $\text{--SO}_3\text{M}$ in which M represents an atom or an atomic group selected from hydrogen, an alkali metal, an alkaline earth metal, an ammonium group and an organic amine group (column 2, lines 20-28), wherein the melting point of the amine compound is 50°C or

more (column 4, lines 33-47 – listed amines have melting points over 180°C– taurin, N,N-bis-hydroxyethylaminoethane sulfonic acid).

As per claim 30: an ink jet recording apparatus comprising at least a recording head including a liquid ejection surface comprising at least two nozzles for independently ejecting at least two liquids to form an image on the recording medium (column 1, lines 11-18) and an ink set comprising water (column 2, lines 2-12), a colorant and a water-soluble organic solvent (column 2, lines 31-32), wherein the ink jet ink composition comprises at least one amine compound represented by the following formula (2):



wherein the amine compound represented by the formula (2) is any one of primary to tertiary amine compounds; at least one of three substituents represented by R₁', R₂' and R₃' in the formula (2) comprises a hydrocarbon group having a hydroxyl group; and at least one of the three substituents comprises a hydrocarbon group containing an alkyl group having at its terminal either one of --CO₂M and --SO₃M in which M represents an atom or an atomic group selected from hydrogen, an alkali metal, an alkaline earth metal, an ammonium group and an organic amine group (column 2, lines 20-28), wherein the melting point of the amine compound is 50°C or more (column 4, lines 33-47 – listed amines have melting points over 180°C– taurin, N,N-bis-hydroxyethylaminoethane sulfonic acid).

As per claims 36, 42, 48: the melting point of the amine compound is 100°C or more (column 4, lines 33-47 – listed amines have melting points over 180°C – taurin, N,N-bis-hydroxyethylaminoethane sulfonic acid). .

As per claims 37, 43, and 48: the melting point of the amine compound is 180°C or more (column 4, lines 33-47 – listed amines have melting points over 180°C – taurin, N,N-bis-hydroxyethylaminoethane sulfonic acid). .

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the ink, method, and apparatus taught by Koitabashi et al. with the disclosure of Yui et al. in order to realize high quality images made with an ink that prevents clogging in the printhead and can be stored long term. It is also well known in the art to use different amines and different types of colorants in an ink, as well as different amounts of amines, as shown by Yui et al, therefore, it would have been obvious to use different amines within an ink.

Koitabashi (348) discloses the following claim limitations:

As per claim 17: a recording medium transfer section for transferring a recording medium in one direction while the recording medium faces the liquid ejection surface and a shortest distance between the recording medium and the liquid ejection surface is constantly maintained, the recording head moving in a direction perpendicular to the transfer direction of the recording medium (column 11, lines 10-32).

As per claim 24: a recording medium transfer section for transferring a recording medium in one direction while the recording medium faces the liquid ejection surface and a shortest distance between the recording medium and the liquid ejection surface is

constantly maintained, the recording head moving in a direction perpendicular to the transfer direction of the recording medium (column 11, lines 10-32).

As per claim 30: a recording medium transfer section transferring a recording medium (column 7, lines 1-22) in one direction while the recording medium faces the liquid ejection surface and a shortest distance between the recording medium and ejection surface is constantly maintained (column 11, lines 10-32) for printing images while moving the recording head in a direction perpendicular to the transfer direction of the recording medium.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the ink jet recording apparatus of Koitabashi et al. with the disclosure of Koitabashi (348) because it is well known in the art as a mechanism for efficient printing.

As per claim 18, Koitabashi et al. as modified disclose an ink jet recording apparatus except for the shortest distance between the liquid ejection surface and the recording medium is in a range from 1.0 mm to 2.0 mm and a largest length of the liquid ejection surface in the recording medium transfer direction is 2.54 cm or more. It would have been obvious to one having ordinary skill in the art at the time the invention was made to maintain a range of values for the distance between the liquid ejection surface and recording medium and the recording medium transfer direction, since it has been held that where the general conditions of a claim are disclosed in the prior art,

discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

Response to Arguments

Applicant's arguments with respect to claims 8, 10, 12, 14, 17, 18, 20, 22, 24, 26, 28, and 30-49 have been considered but are moot in view of the new ground(s) of rejection.

It is noted that the argument that it is well known to use different amines in an ink, thus it would have been obvious to modify the ink with an amine taught by Koitabashi et al. with the amine taught in Yui et al.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Laura E. Martin whose telephone number is (571) 272-2160. The examiner can normally be reached on Monday - Friday, 7:00 - 3:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen D. Meier can be reached on (571) 272-2149. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/L. E. M./
Examiner, Art Unit 2853

Laura E Martin

/Manish S. Shah/
Primary Examiner, Art Unit 2853